



PATHFINDER

An informal newsletter published for the GPS user community by PM GPS. Information presented is based on published and submitted news items of interest to the general user. Widest dissemination and reproduction is encouraged. Newsworthy items are solicited for inclusion. Editor Mr. Don Mulligan at PM GPS, PM NAV SYS, Ft Monmouth NJ DSN 992-6137 or (732) 532-6137 or email: Donald.Mulligan1@us.army.mil

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Avoiding the Future Jam (see page 2)

PM's Corner



Hello GPS Users!

As you read this, the PM GPS team is beginning the multi-year process of fielding DAGR to Army units worldwide.

The pace of fielding will be determined by the Army budget. We will field DAGR as quickly as the budget allows.

DAGR is a state-of-the-art handheld design but it is also substitutable for PLGR in existing host platform applications. There are significant differences in operator use of the new more capable DAGR and that is why we are providing a thorough New Equipment Training (NET) course as part of the fielding process. I urge every command to make the most of NET resources when offered. Once our NET team leaves a Post, Camp or Station, it will be difficult to schedule a return visit.

Also, please take note of the comparison of military versus commercial GPS receivers in the "Jamfest" article. Stick with "Secure GPS"!

Questions? Contact me or my staff via the "Contact Box" elsewhere in this issue.

Skip Harborth, LTC, SC
Product Manager, GPS

DAGR Fielding Begins!

One year ago the DAGR production contract was awarded to Rockwell Collins Inc. After extensive "First Article" testing, approval was granted for production in March 2004. PM GPS immediately placed the first order buying over 10,000 DAGR. Several thousand have been delivered and more are coming monthly.

PM GPS is finalizing the details of DAGR fielding schedule with Major Army Commands. The First Unit Equipped (FUE) milestone will occur in 1QFY05.

DAGR fielding is a multi-year process to displace the veteran PLGR which will be recycled to backfill Army GPS requirements in lower priority units so in the near-term there will be a mixture of PLGR and DAGR in service. The actual number of DAGR fielded will depend on Army funding.

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DAGR provides Secure GPS data in a handheld package measuring 1.5" deep, 3.5" wide, 6.5" high and weighing just under 1 pound.

**REMEMBER! PPS is not just GPS,
It's SECURE GPS!**

DAGR Fielding (Continued fm Page 1)

The Total Army requirement for DAGR is estimated to be in excess of 152,000 receivers.

DAGR replaces PLGR as the primary PPS-rated handheld GPS receiver. In so doing, it provides the same PPS-rated GPS positioning data as PLGR but adds graphics and other performance improvements.

In addition to the handheld role, DAGR also displaces PLGR in many host platform installations where

PLGR provides PPS-rated GPS data to host weapon or communications systems. As noted in the "backward compatibility" article in this issue, host platform integrators are now verifying DAGR interoperability with existing PLGR applications.

The Total Army DAGR Fielding program is being managed at the Fort Monmouth Field Office.

Ed McAuley, DSN 992-6136

"JAMFEST" - Expect Trouble in The Future!

Recent tests highlight the differences between Commercial and Military GPS receivers.

GPS proved its utility to the military in Operation Desert Storm and soldiers have been relying on GPS to provide positioning and navigation information ever since. Today GPS is widely used in both Afghanistan and Iraq.

However, many soldiers are using commercially available handheld GPS receivers that are easier to use and have better displays than the currently fielded PLGR. These receivers do not perform the same as military receivers, especially in an electronic warfare environment. The use of commercial receivers hasn't been a problem in Iraq since the Iraqi jamming capability was neutralized in the early stages of the war. This may have created a false sense of security for the use of commercial GPS receivers. Our next adversary may be more sophisticated and have the capability to deny GPS usage on the battlefield. A GPS jamming device can be built inexpensively from parts found at your local Radio Shack store.

The increasing use of commercial receivers in combat zones was one of the reasons the GPS JPO decided to include comparative testing of military versus commercial GPS receivers in a recent exercise called "Jam Fest". Testing to evaluate the availability of GPS positioning data from these receivers was conducted in representative jamming environments at the White Sands Missile Range in New Mexico in Spring 2004.

The military receivers used for this exercise included the next-generation Defense Advanced GPS Receiver (DAGR) and the Ground Based-GPS Receiver Application Module (GB-GRAM) as well as the veteran Precision Lightweight GPS Receiver (PLGR) which entered service in 1993. The DAGR and GB-GRAM operate on dual frequencies (using both the L1 and L2 GPS frequencies). They also use the encrypted Y-code signal from all of the GPS satellites in view. The PLGR operates on the L1 GPS frequency only and it uses the encrypted Y-code signal from up to five of the GPS satellites in view.

The commercial handheld receivers evaluated included

the Magellan Meridian, Lowrance iFinder Pro and the Garmin E-Trex Legend. These products are available at military PX facilities and electronics stores. All three receivers operate on a single frequency and use the unencrypted commercial C/A-code signal from all of the GPS satellites in view.

Results of the comparison tests?

In general, the Jam Fest results showed that military GPS receivers outperformed commercial GPS receivers during jamming and that it was significantly easier to jam commercial receivers.

One of the DAGRs used in the test was configured to use the unencrypted C/A-code signal so it would function like a commercial receiver. Even with that limitation, the DAGR still outperformed commercial sets.

Finally, a comparison was made between the performance of the next-generation DAGR and GB-GRAM products and the legacy design PLGR. Although DAGR and the GB-GRAM outperformed the PLGR during jamming, the PLGR still outperformed the newer commercial receivers.

The conclusion was clear: Military receivers, both old and new designs and even when un-keyed, perform better than commercial receivers. While GPS jamming may not be a hot issue in Iraq today, it is expected to be a concern in future conflicts. Soldiers relying on commercial receivers may find themselves lost when the jamming begins. In the same way that "unsecure" radio communications can compromise a mission, "unsecure" GPS could deny you accurate positioning information when lives are at stake.

For more information on "recognizing and countering GPS jamming" see the article by that title in the April 2004 issue of Pathfinder available at the website.

GPS Product Office in Los Angeles

Backward Compatibility—DAGR and PLGR

The phrase “Backwards Compatibility” means DAGR is designed to be fully compatible with existing PLGR applications. That is to say “If the PLGR works in a host platform application, you can be assured DAGR will work in the same platform in the same way”.

The purpose of Backwards Compatibility also referred to as “interoperability”, is to minimize change when host platform weapon systems upgrade from PLGR to DAGR. This saves time and money. Backwards Compatibility was a design requirement for DAGR and it is now being verified by host platform integrators.

Question: The DAGR looks to be much smaller than PLGR so how can we say a DAGR replaces a PLGR?

Answer: Yes, outwardly the PLGR and DAGR have different “form and fit” but the functionality of the critical internal processes does not vary between the two. This is best explained by discussing the two elements of Backwards Compatibility: **Electrical** and **Physical** interface.

The **Electrical** Interface defines how the GPS receiver communicates with an external device. The messages transmitted and received through the data port are spelled out in the Interface Control Document or ICD. To make up an example, say the host platform uses ICD message #99 to ask a PLGR “what is our current position?” The PLGR will provide the answer in a message format that is also spelled out in the ICD. PLGR and DAGR use the same ICD message definitions so the internal **Electrical** interface is standardized and any system asking a PLGR or DAGR message #99 will get the same answer.

By comparison, the **Physical** interface does vary a bit due to the size differences.

Although PLGR was designed to be primarily handheld, it is also used as a semi-permanently installed source of GPS data in many weapons systems. In each case, the weapon system integrator decided if common PLGR accessories were sufficient or if special parts were needed. For example, a PLGR on a firing platform needs a mount that can absorb the shock of firing munitions while a PLGR installed to a HMMWV can use the standard PLGR mounting plate.

For platforms that were able to use standard PLGR installation accessories, PM GPS designed the DAGR

mount to use the same hole pattern as the PLGR mount. So even though the DAGR is smaller, the standard DAGR mount fits the same holes that were drilled for a standard PLGR mount. Adapter plates are allowed when necessary. Hopefully, this will save time and money for platforms using standard DAGR accessories.

So the “dynamics” of the host platform vary and each host platform integrator will determine when standard accessories are good enough or if more rugged parts are needed. Each Host Platform integrator is responsible for Configuration Manage-

ment of their platform, so it is their decision to use standard DAGR installation parts or to replace them to compensate for the “shake, rattle and roll” of their platform.

Those offices are also responsible to verify that

their DAGR installation provides physical security and durable connections that maintain host platform data, power and remote antenna connections at all times.

So **electrical** “Backwards Compatibility” is assured thanks to the common ICD. The **physical** interface will be assured as a result of the efforts underway by each host platform integrators. They are providing progress reports on their work to verify DAGR Backwards Compatibility to the GPS product office in Los Angeles and the PM GPS Ground Receiver Integration Team (GRIT) in Georgia.

Frank Rowe at Georgia DSN 468-9511

Operator Training is another important element in transitioning from PLGR to DAGR!

While PM GPS is providing New Equipment Training (NET) as part of the DAGR fielding process, the training is focused on handheld operations.

Host platform integrators are responsible to update weapon system training support packages to include how DAGR interfaces with their system. Computer Based Training (CBT) products to assist with DAGR training for personnel who cannot attend DAGR fielding NET classes will be available soon. Host platform integrators should contact PM GPS to get copies to support familiarization training to update their weapon system operators.

PLGR Return for Repair Procedures from Iraq

The procedures for turning in PLGR for repair by units deployed to Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) has a slight twist.

The deployed Corps Commanders and the CECOM Logistics Readiness Center (LRC) established an Electronic Sustainment Support Center (ESSC) in theater to expedite maintenance support for OIF/OEF units.

What does this mean to the soldier in Kuwait, Iraq or Afghanistan?

The procedure for turning in a faulty PLGR for repair includes using a Regional Support Center (RSC). RSC sites are at Camp Victory, Camp Anaconda, FOB Danger and Camp Arifjan. These RSC sites send equipment back to the theater facility in Kuwait where it is tested, packaged and shipped to the repair depot in Cedar Rapids, Iowa. There is also an RSC in Bagram Afghanistan that ships items from that Area of Operation via Fort Bragg NC.

What should I do with a faulty PLGR?

Zeroize your PLGR (use the Menu, Do not use the Emergency zeroize function).

Remove the prime power battery but leave the memory battery installed.

Turn the PLGR in to your Direct Support BN or Forward Support BN. (FSB).

DS/FSB turn in PLGR to appropriate RSC (unit must have DA Form 1687, Delegation Of Authority) with DD Form 1149 and DA Form 2407. Be sure the 1149 includes the owning unit and its DODAAC!

RSC staff performs initial inspection, tags PLGR with DA Form 2402 and transports it to Kuwait for shipment back to Rockwell Collins. (The RSC in Afghanistan ships via Fort Bragg).

What happens once my PLGR is turned in?

Rockwell Collins replaces your PLGR from a pool of ready-to-go repaired assets. The replacement PLGR is Fed-Ex'd to the theater facility in Kuwait (or to FT Bragg for units in Afghanistan) and the RSC then ensures the replacement PLGR gets to the owning unit.

If you have questions on the status of your PLGR, direct them to your supporting RSC at one of the locations noted above.

Randy Robinson at DSN 992-6140

But Is Our PLGR Repair Covered by Warranty?

This is one of the most-frequently asked questions we get from field users. We understand the reason for asking if a PLGR is covered by warranty before you send it for repair because with most products, the warranty status determines whether or not the unit has to pay for repairs. Fortunately, in the case of the PLGR, the warranty coverage doesn't matter!

As of October 2004, most PLGR are still covered by the manufacturer's warranty. The original warranty was extended several times but individual PLGR labels were not updated so you can't go by the expiration date on your PLGR label. No additional extensions of PLGR warranty are planned and warranty coverage is beginning to expire for the oldest PLGR but this doesn't affect your course of action to get non-functioning PLGR repaired. Why?

First, because there is no organic repair for PLGR so regardless of warranty status, there is only one place to get a PLGR repaired: The manufacturer Depot.

Second, because whether or not your PLGR is

covered by warranty, it will be repaired or replaced at no cost to the operating unit. If the warranty has expired, you will still get a no-cost replacement at this time. This is because Army Headquarters is currently funding the repair of warranty-exclusions for Army PLGR.

In the same way, the Air Force and Marines are funding their PLGR repairs. The Navy is the only exception where users have to requisition replacements through the supply system.

That should make it easy to understand: If you have faulty or damaged PLGRs, return them to the repair depot regardless of warranty status. Repair return instructions for each service are provided in the O&M manual. Note the modified instructions for units in OIF/OEF provided in the article above.

You'll also find PLGR return/repair guidance at the PM GPS website.

Diana Wright at DSN 468-5096

Update on PLGR to HMMWV Installations

Over the years, many Army users have installed PLGR into HMMWV to gain a stable power supply while providing GPS data to other installed systems such as seen at right. Using the HMMWV as a power source cuts down on PLGR battery consumption and the roof or windshield-post mounted external antenna usually improves satellite signal reception.

The PM for Light Tactical Vehicles (PM LTV) at the US Army Tank & Automotive Command (TACOM) and AM General, the HMMWV manufacturer, developed official PLGR installation kits. The kits and Installation Instructions were made available to install PLGR in various models of HMMWV.

In the official TACOM kits, the PLGR external power cable was routed to the vehicle battery terminals. In field expedient installations, the PLGR power cable is sometimes routed over the edge of the battery box or through a hole in the battery box without a grommet. These variations sometimes result in pinched or broken power cables, short circuits or even fire hazards.

TACOM recently announced two improvements that should be of interest to HMMWV operators.

First, TACOM has updated the official PLGR installation kit designs. The new kits will be available shortly. The new kits and part numbers are as follows:

PLGR Installation Kit 57K4400 for M998, M998A1, M998A2, M1113 less the M996/A1 & M997/A1/A2.

PLGR Installation Kit 57K4399 for M1114.

Second, TACOM is releasing a kit to provide a 12 - 24 VDC power Bus Bar in the cabin to power accessories which eliminates the need to run a separate PLGR external power line to the battery box. The Bus Bar ECP is in final review at TACOM and should be released shortly.



Typical PLGR installation to a HMMWV dash with the FBCB2 system on the left. AM General photo.

If you properly installed PLGR per the original TACOM kit designs there is no need to retrofit the new kits. TACOM recommends using the new kits when you install PLGR to additional HMMWV.

PM GPS will update our "PLGR to HMMWV" data sheet to reflect the new TACOM information including the bus bar solution. These data sheets and the updated TACOM Installation Instructions will be posted to the Army PM GPS website as soon as we have them.

Mr. John Krzywiecki at TACOM (586) 753-2597 or

William Burnette, Jr. at PM GPS Georgia Field Office, DSN 1109 or DSN 468-1109

Questions about Reprogramming PLGR?

Standard Tan PLGR Uses 613-9854-005

Enhanced Green PLGR Uses 613-9868-008

MWO 11-5825-291-30-4 (Feb 03)

Reprogramming Kit 5825K3118012ANS

Software Assistance: Frank Rowe at DSN 468-9511

Reprogramming Assistance: Bill Pohlmann at DSN 992-6131 or

William Burnette DSN 468-9511.

See July 2004 issue online for more PLGR Reprogramming information!

How to Contact PM GPS

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468-3288 johnny.walker@robins.af.mil or
Mr. William Burnette (478) 926-1109, DSN 468-1109

Who to Call?

For GPS platform integration and new products, call the PMO.

For equipment authorizations, maintenance status, fielding, host vehicle installations and New Equipment Training, call the MFO.

For sustainment support including software, supply, technical publications and accessories, call the GFO.

If you need further assistance, contact the editor (see top of front page) or call one of our Help Lines:

Willie Jackson in Georgia at DSN 468-3518
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